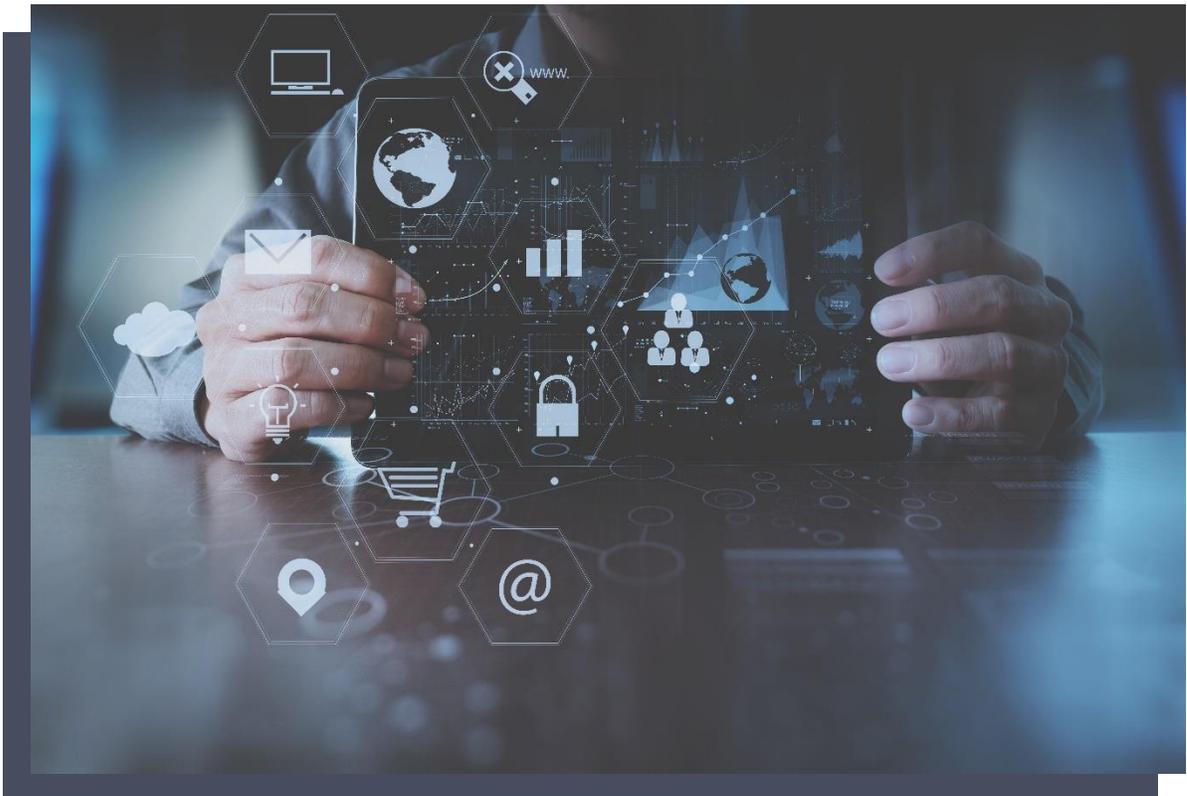


# ■ **Architecture and Security**

## Enterprise Robotic Process Automation 2020



**ProcessRobot 2020.1**



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# Introduction

ProcessRobot is the leading enterprise robotic process automation platform aimed at helping enterprises to dramatically reduce operational costs, increase efficiency, improve productivity and accelerate performance by automating routine operations across the entire organization, organizing structured workflows and enhancing data quality. Say goodbye to costly implementations and complete more tasks in less time.

This paper describes the architecture linking each module of ProcessRobot, the way each module and component works, and the increased security built into the platform.

ProcessRobot is the leading enterprise robotic process automation platform, which helps enterprises dramatically reduce operational costs, strengthen and increase efficiencies and improve productivity. Furthermore, it accelerates performance by automating routine operations across the entire business, organizing structured workflows and enhancing data quality. These results, in turn provide the ability to plan, forecast and report in a highly reduced timeframe.

Integration is seamless and it can be quickly adapted to new business demands and changes with agile robots. It is fast to deploy, easy to use and the best value on the market.

This paper describes the architecture of ProcessRobot, the way each module functions, communicates and interacts with each other and the state of the art security built into the platform.



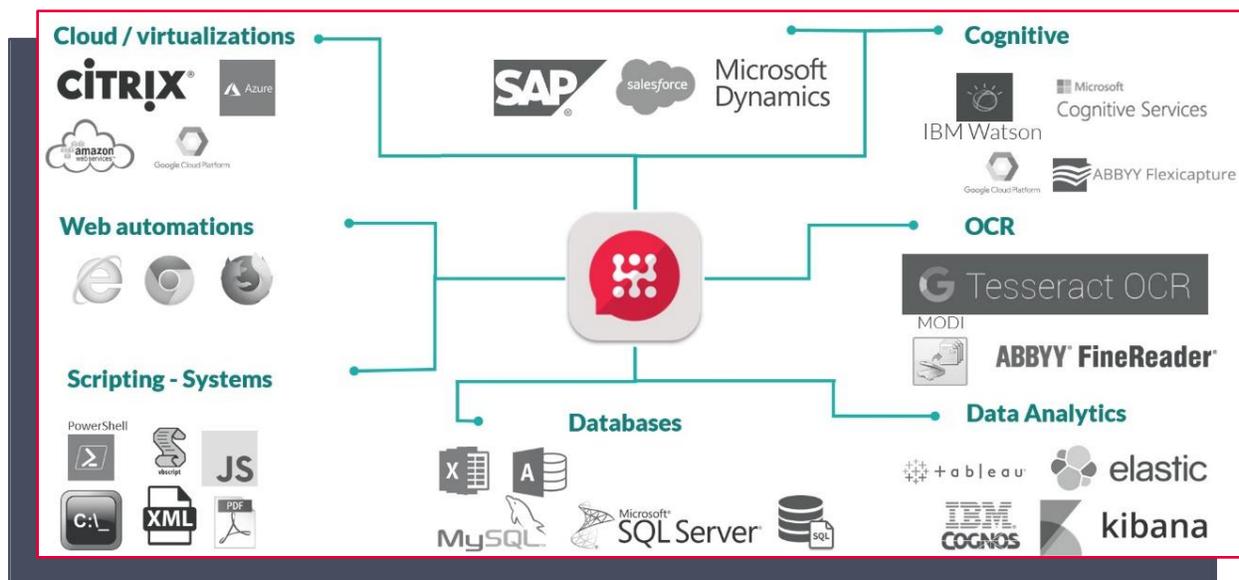
# Definitions, Acronyms and Abbreviations

Acronym / Abbreviation	Definition
<b>FTE</b>	Full-time equivalent (FTE) is a unit that indicates the workload of an employed person in a way that makes workloads or class loads comparable across various contexts.
<b>IIS Server</b>	IIS (Internet Information Services) also known as Windows web server is available on most versions of Microsoft Windows operating systems. It hosts websites, web applications and services needed by users or developers.
<b>Kerberos Authentication</b>	Kerberos is a computer network authentication protocol that works on the basis of tickets to allow nodes communicating over a non-secure network to prove their identity to one another in a secure manner.
<b>Redis</b>	Redis is an open source (BSD licensed), in-memory data structure store, used as a database, cache and message broker. It supports data structures such as strings, hashes, lists, sets, sorted sets with range queries, bitmaps, hyperloglogs and geospatial indexes with radius queries. Redis has built-in replication, Lua scripting, LRU eviction, transactions and different levels of on-disk persistence, and provides high availability via Redis Sentinel and automatic partitioning with Redis Cluster.
<b>Role Based Access Control (RBAC)</b>	Role-based access control (RBAC) is a method of regulating access to computer or network resources based on the roles of individual users within an enterprise. In this context, access is the ability of an individual user to perform a specific task, such as view, create, or modify a file.
<b>Single sign-on</b>	Single sign-on (SSO) is a session and user authentication service that permits a user to use one set of login credentials (e.g., name and password) to access multiple applications.
<b>SQL AOAG</b>	SQL Always On Availability Groups



# ProcessRobot Platform Overview

ProcessRobot is able to interact with different systems and technologies. It is compatible with all major Cloud technologies and browsers. ProcessRobot integrates successfully with major Cognitive and OCR platforms by the leading vendors in the market. Scripting systems and database technologies are fully integrated as well. Lastly, ProcessRobot can be linked with all major Data Analytics platforms to represent the progress of the executed processes.

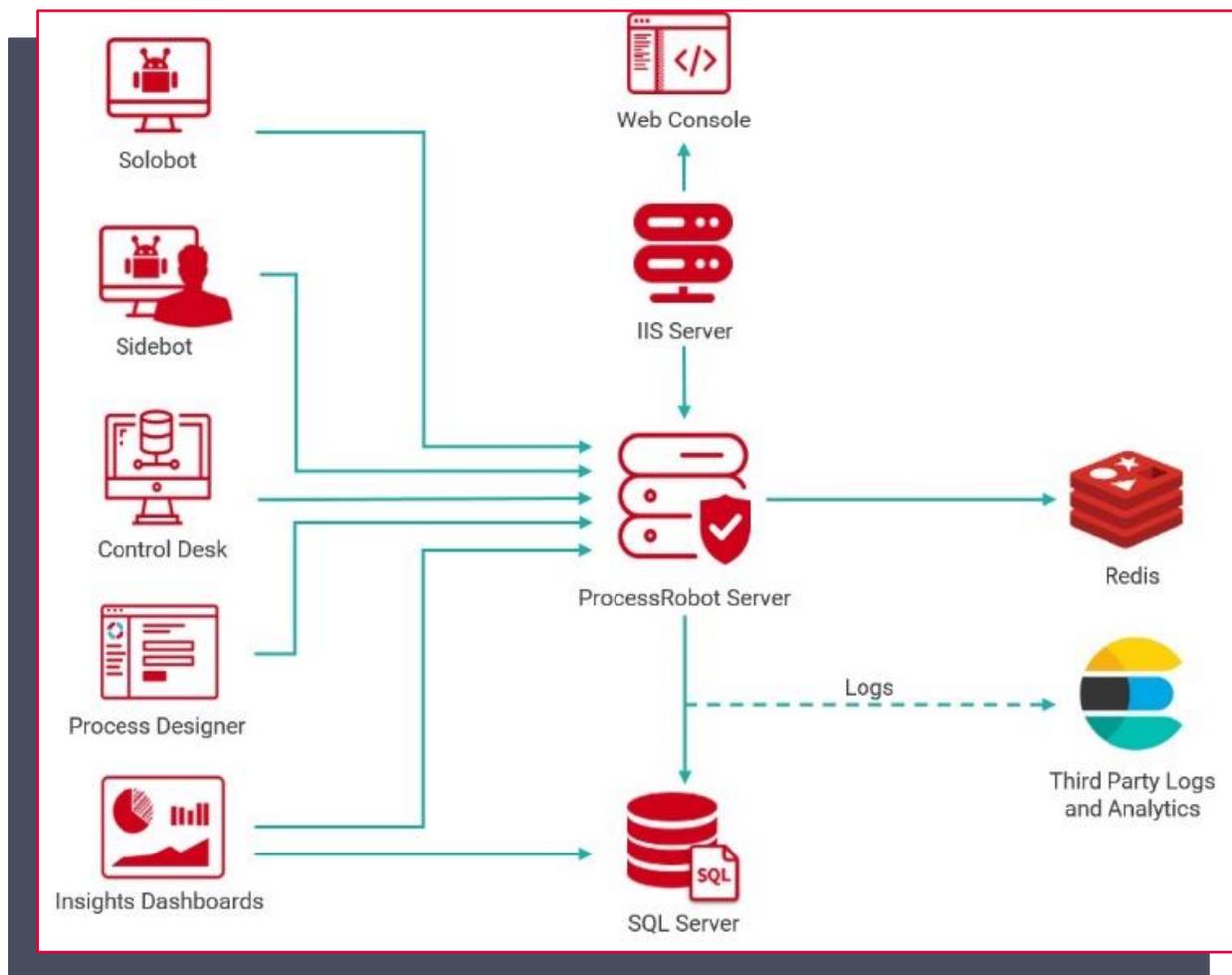




# ProcessRobot Architecture Overview

ProcessRobot works as a new “department” specialized in automation within your organization. Departments in a business have a production component and a managerial component and these roles are performed by human workers.

ProcessRobot also has a managerial and a production component. However, the difference is that the production side employs virtual workers (Robots) instead of humans and the managerial side is operated by the Center of Excellence. Robots accept and perform work from human departments within your organization, freeing up valuable time for more value-added activities and focus on their core business tasks.

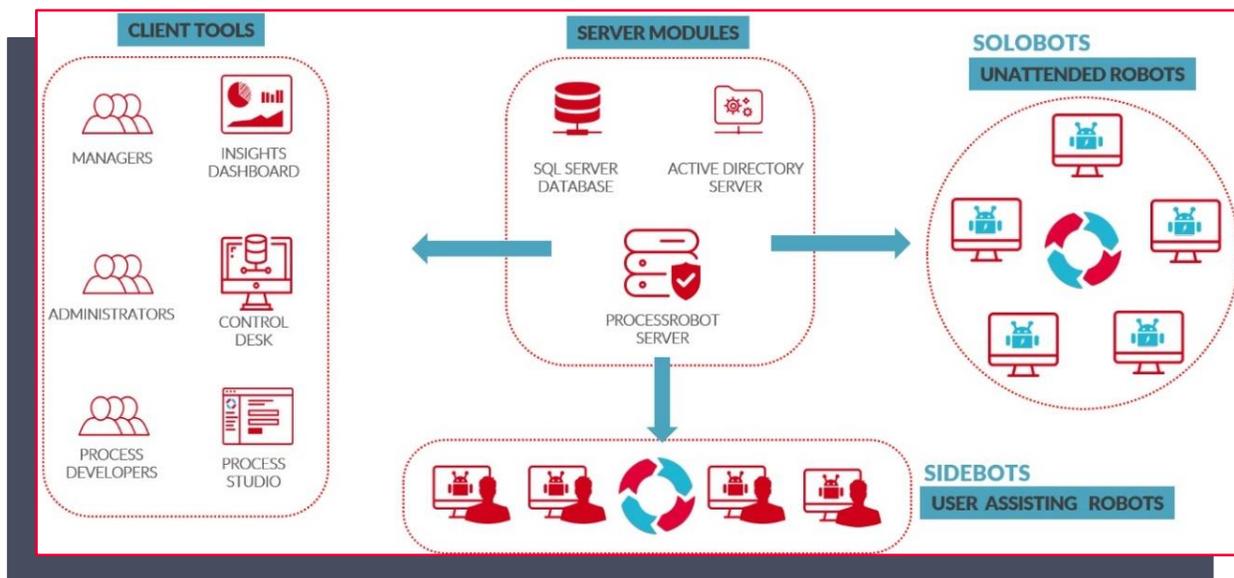




## ProcessRobot Server Modules

ProcessRobot's architecture can be summarized in the following diagram, which consists of the Client Tools, Server Modules and the Robots which can be either SoloBots for Unattended Automation or SideBots for Attended Automation.

In order for ProcessRobot to function, it requires access to a SQL database, which holds all the data of the ProcessRobot installation such as the processes, the users, the roles etc. Optionally, an Active Directory Server can be used to handle user authentication. Optionally, an Active Directory Server can be used to handle user authentication.





## ProcessRobot Components

### SERVER MODULES



**ProcessRobot Server** is the central hub of ProcessRobot. The Server is responsible for storing processes on the database as well as facilitation and communication with all other components.



The **SQL Server**, holds all the information for the ProcessRobot installation such as the users, processes and roles.



The **IIS Server**, hosts the ProcessRobot web application which is then represented as the Web Console to the web browser users.

### UNATTENDED ROBOTS



**SoloBots** are the back office/unattended robots of ProcessRobot. They are installed on their own separate machines (usually dedicated VMs) and can log in and out automatically. They essentially work as independent workers and are equivalent to an FTE. They are used for automated processes that do not require human intervention. Automated processes are processes that can be scheduled or triggered to run from start to finish in an unattended mode.

### USER ASSISTING ROBOTS



**SideBots**, are the front office/attended robots of ProcessRobot. Technically, they are similar to SoloBots, the main difference being that they are installed on (human) users' machines and are designed to handle automated processes that require collaboration / interaction with a user. SideBots help them perform everyday tasks faster and with 100% accuracy.



## CLIENT TOOLS

ProcessRobot offers different Client Tools (Control Desk, Process Studio and Insights Dashboard) assembled in a technical **Center of Excellence**. These Tools carry out different roles and enable process development as well as control over the production side.



**Control Desk** is used by the authorized users to control every aspect of the ProcessRobot environment. This Tool automates distribution of Processes and Robot workload across the enterprise, regardless of the size of the installation.

Users of the Control Desk perform key tasks including:

- review /test /evaluate and assign processes sent from developers to production,
- start/stop processes,
- assign processes to robots, monitor robots and process execution,
- set up the operating environment, triggers and schedules, “Checker” function,
- establish environments,
- set up roles and permissions for all users
- set up process load balancing
- access auditing, log monitoring and governance support
- add users, roles, environments, global variables, robot pools as well as queues setting and handling.



**Process Studio** is the developer’s tool. It is a purely “no code required” environment, using ready-made commands (called “Actions”) to set up the small steps of an automation. It is very intuitive allowing business users with minimal training to use it to automate processes easily. Process Studio is equipped with a constantly running debugger, useful for creating error-free automations, in the fastest time possible.

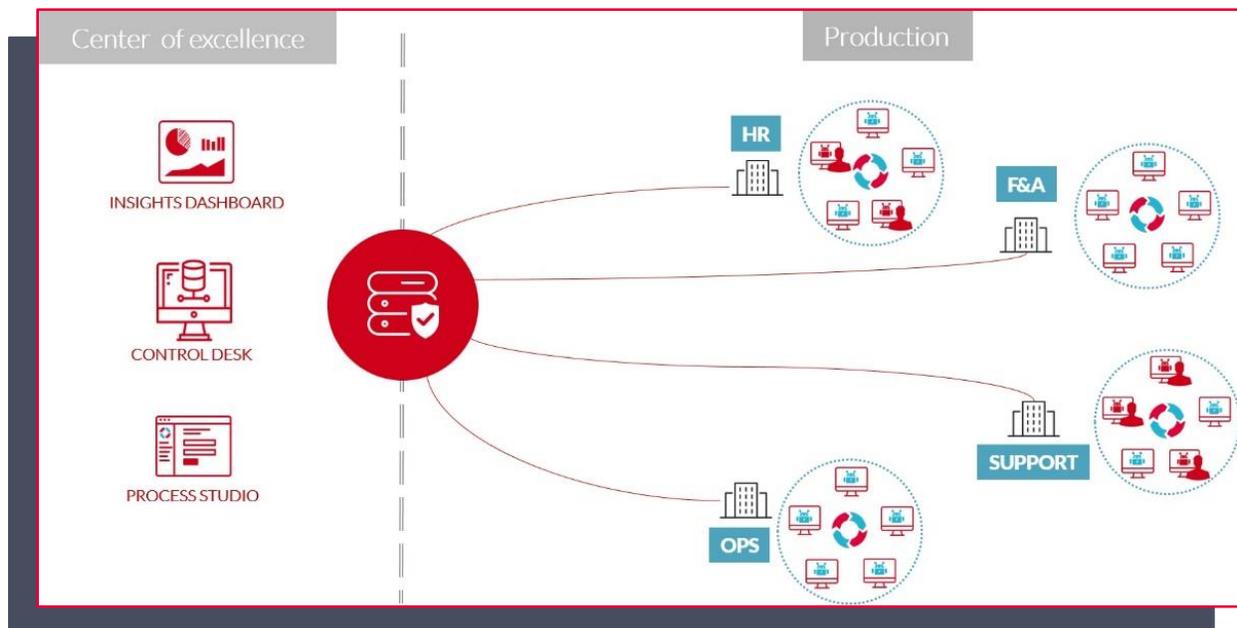
**User Libraries**, enable the developers to create their own sets of Actions where necessary, reducing time, complexity and repeated development.



**Insights Dashboard Designer and Viewer** are the tools used to create and view dashboards respectively. Utilizing drag and drop technology, **Insights Dashboard Designer** enables developers to use a variety of charts, for example pie, bar, grids and combinations in order to create simple or complex dashboards, that are fed with data from custom KPIs from processes. During execution of a process, the custom KPIs created by the user (each one with up to five dimensions) gets updated, and their values are used as data inputs for the Insights Dashboards. **Dashboard Viewer** client tools are installed in user's machines and the user can select and view any dashboard from a pre-determined list.

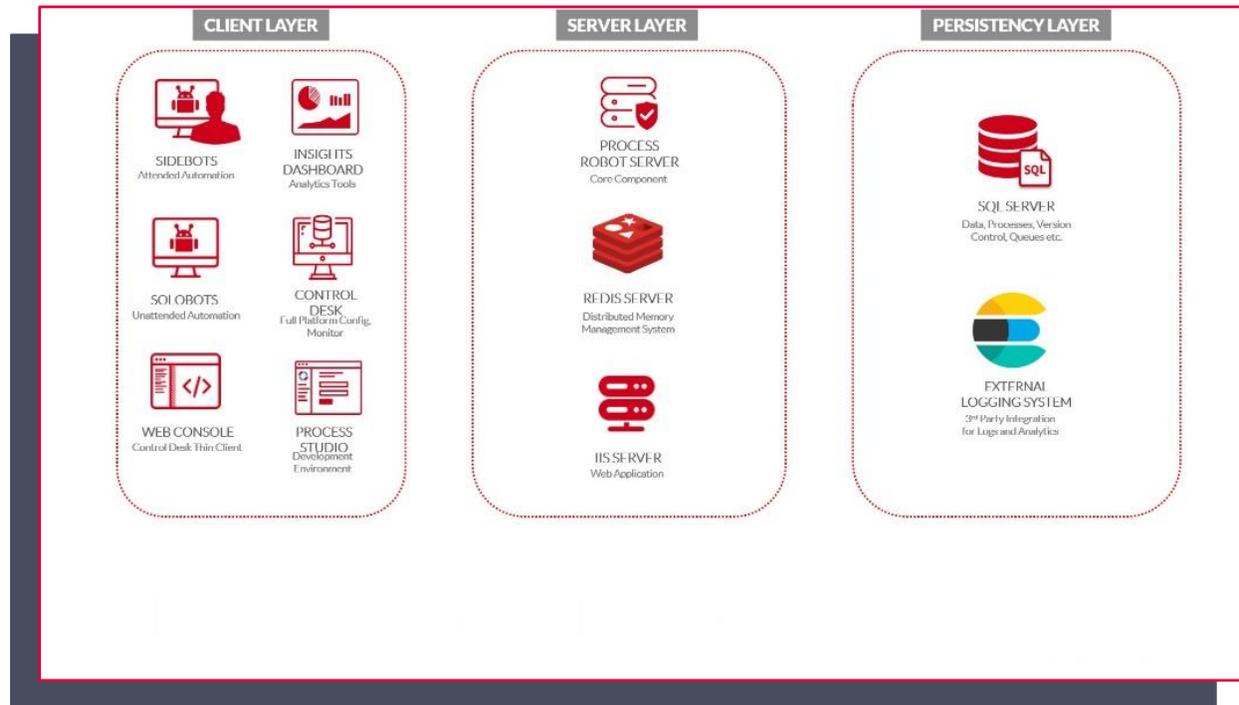
## Center of Excellence and Production

The following diagram shows a ProcessRobot installation with the Center of Excellence (CoE) and the Production perspective. In the CoE there are the Client Tools - Control Desk, Process Studio, Insights Dashboards - and on the Production side there are the SideBots or SoloBots divided in different business departments, for example HR, Finance and Accounting, Support and Operations. These are executing the processes which have been approved for use in production.





## High Level ProcessRobot Architecture Layers



ProcessRobot Architecture, consists of three layers:

1. On the Client Layer, the Client Tools can be used to develop, manage and monitor processes. In addition, the Robots (SoloBot and SideBot) execute the processes on this layer.
2. On the Server Layer, there are the ProcessRobot, Redis and the IIS servers.
3. The Persistency Layer consists of the SQL Server which holds all the information of the ProcessRobot installation as well as any External Logging System.



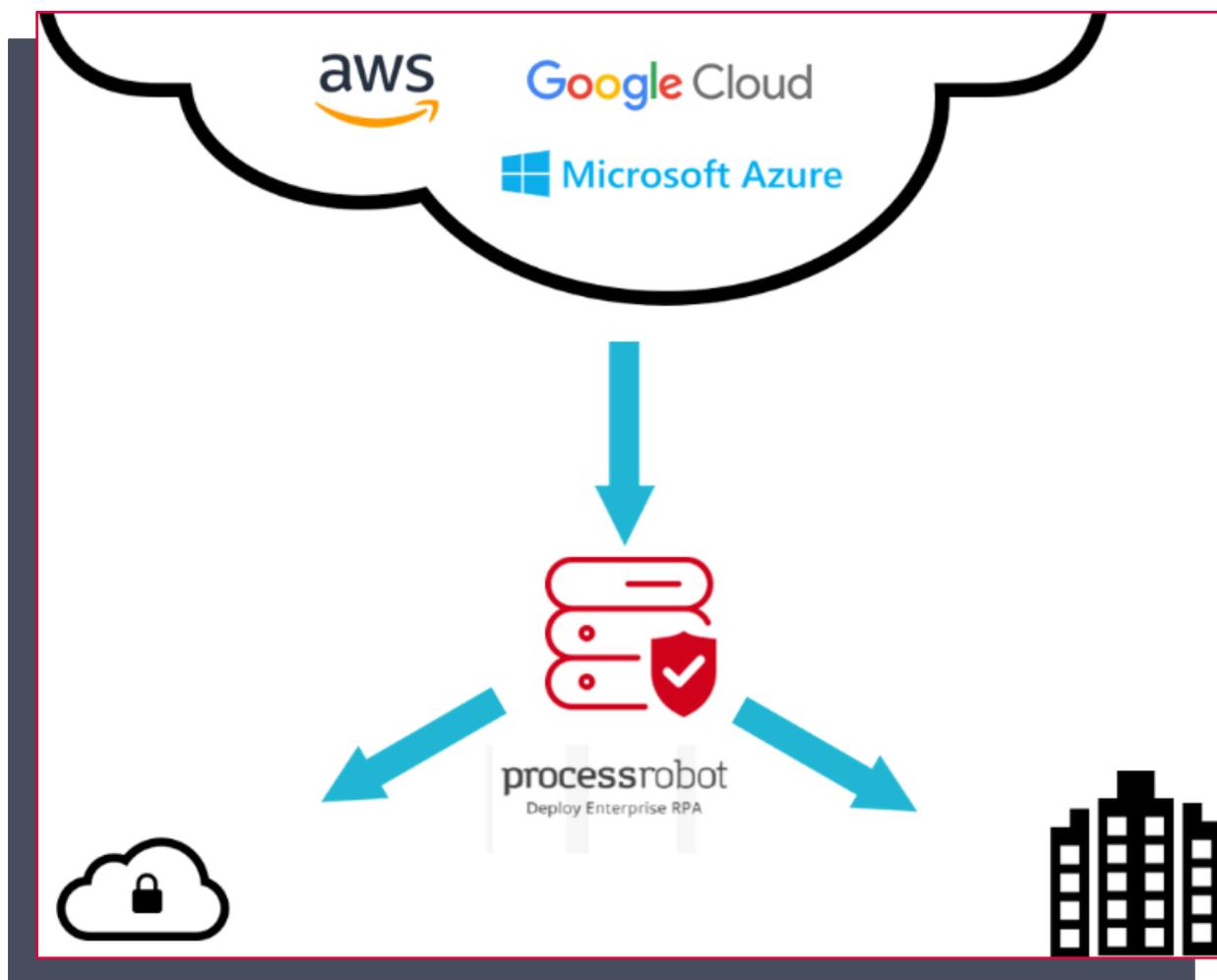
# ProcessRobot Deployment Options

## Where can ProcessRobot be Deployed?

ProcessRobot is able to support any deployment architecture These are:

1. on-premises,
2. on a public cloud provider (AWS, Azure, Google etc...),
3. on a private cloud or
4. on any combination of the above, hybrid.

This flexibility enables the organization to develop highly available, design that can scale up effortlessly in order to accommodate any demand.





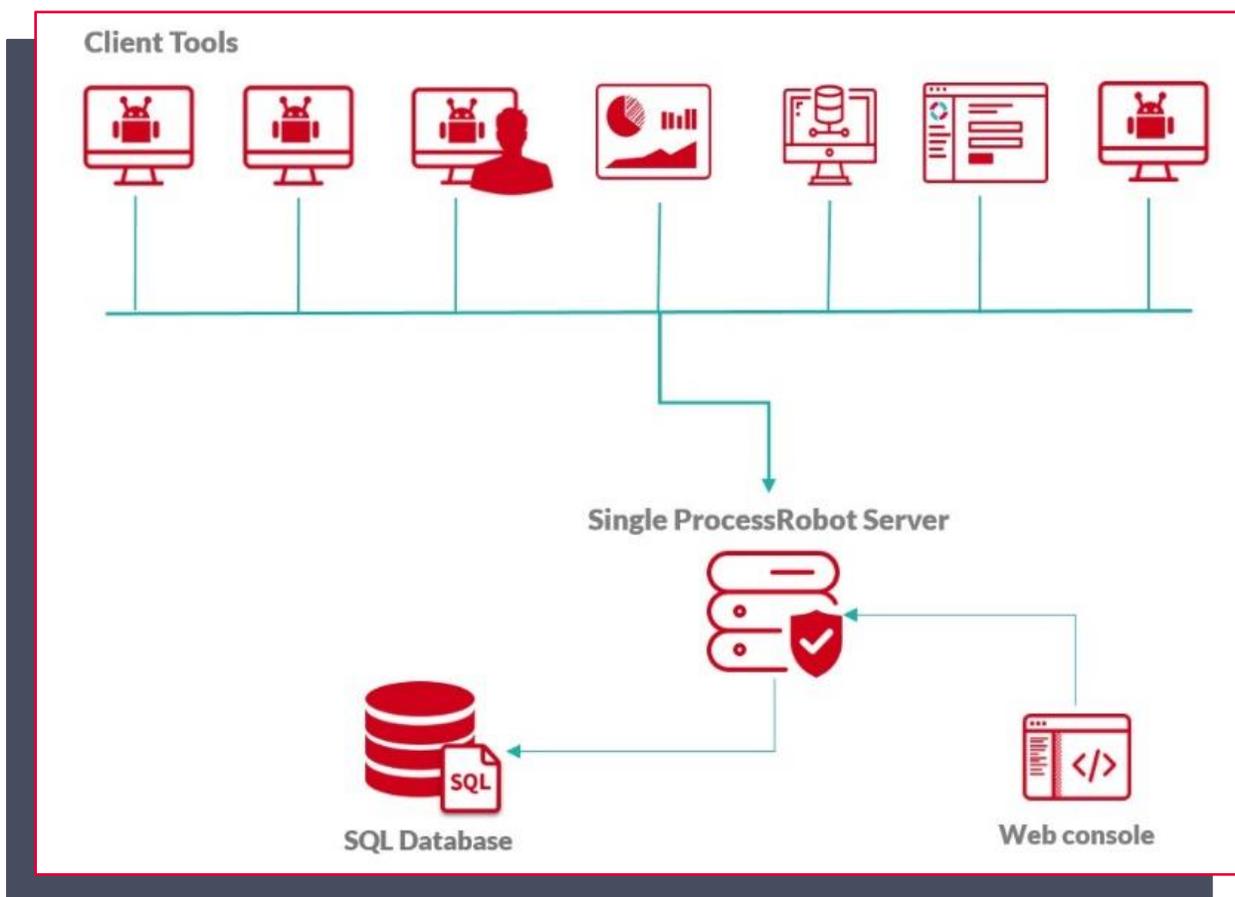
# How can ProcessRobot be deployed?

## Single Server

A single ProcessRobot Server is responsible for handling all the Robot requests.

The Client Tools connect directly to the ProcessRobot Server.

Information is stored into a single SQL Database.





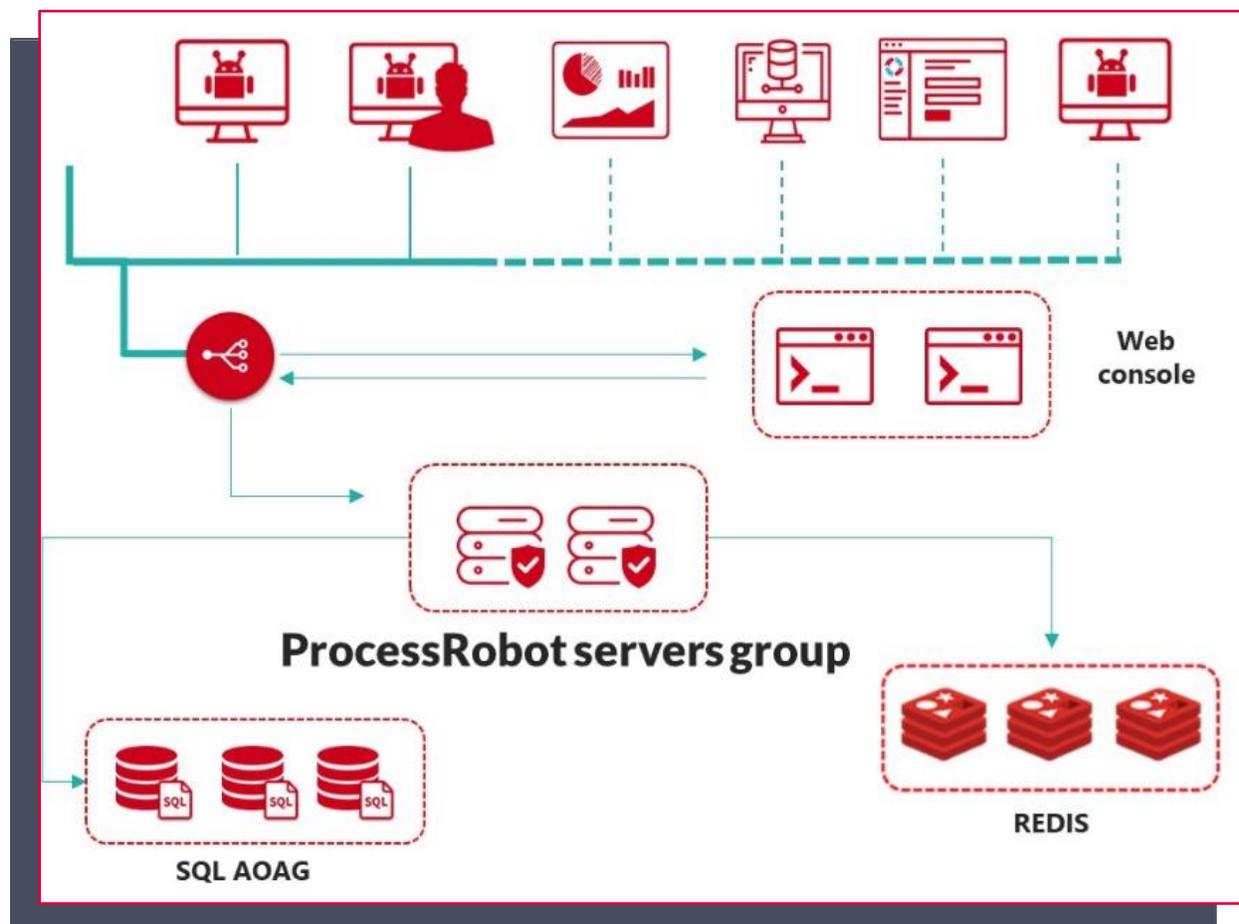
## High Availability and Scalability

The Client Tools are connected to a Group of ProcessRobot Servers through a network (hardware or software) Load Balancer in an Active / Active configuration in order to create a highly available infrastructure.

By implementing this architecture, a ProcessRobot installation can achieve immense scalability through horizontal scaling. A group of ProcessRobot servers is able to scale up or down to meet any current or future business needs.

Information is stored into a SQL Always On Availability Group (AOAG) in order to provide high availability in the persistence layer.

A group of Redis servers in cluster or sentinel mode offers high availability.





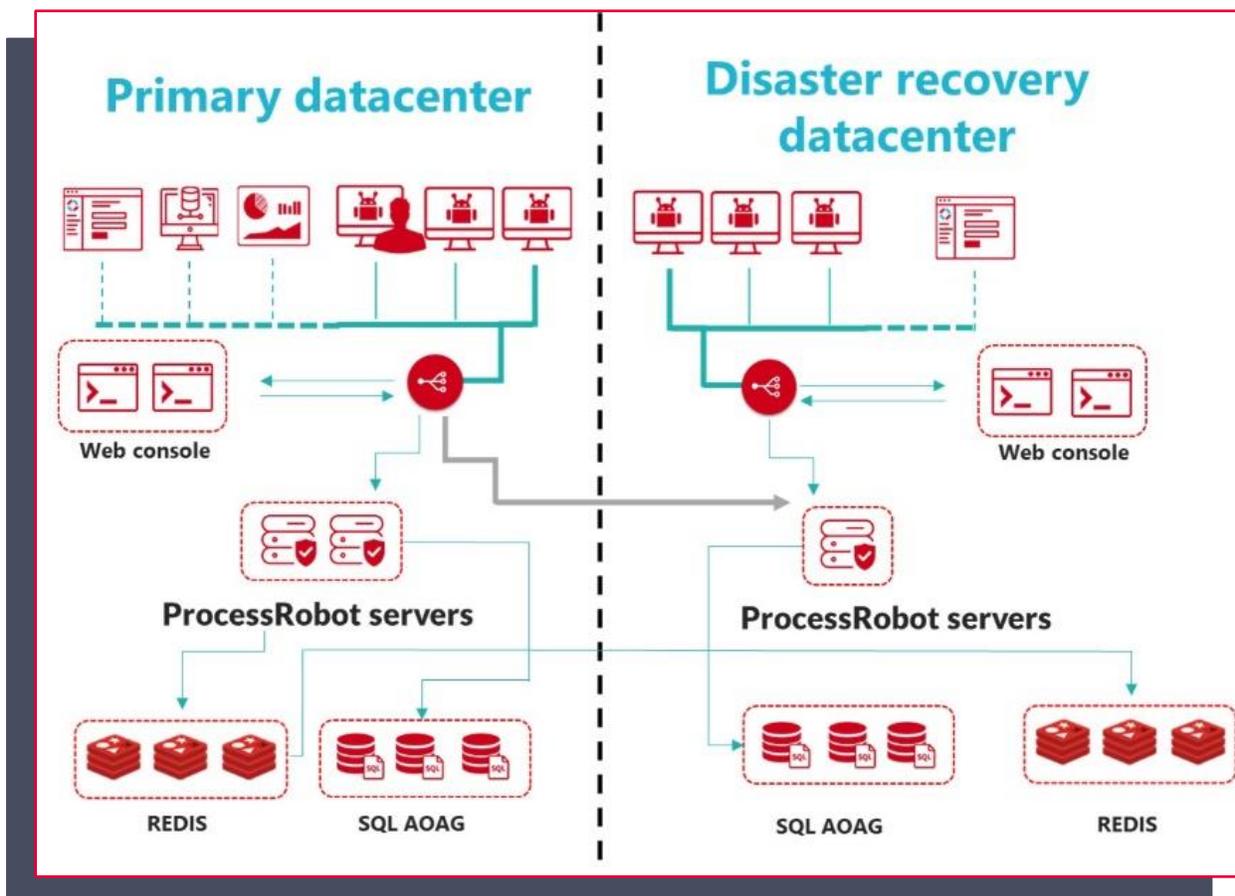
## Disaster Recovery

The Disaster Recovery (DR) deployment inherits the configuration & architecture from the High-Availability deployment option. This can be extended by including a secondary ProcessRobot deployment to a DR data center.

In this scenario information from the primary data center is replicated to a DR site.

In case SQL AOAG is used, then there needs to be at least one SQL Server member of the Availability Group in the DR site.

Lastly, a Redis replica in the DR site ensures the integrity of the ProcessRobot server's state, thus the uninterrupted execution of processes in case of a disaster.





# ProcessRobot Security Aspects

- ProcessRobot uses a Master key which can be set in the Control Desk. This key is used to encrypt all the user passwords provided which are required for SoloBots Autologin and the hidden values in the Credentials Manager.
- All the actions that contain a password are encrypted with AES-256 bit encryption and the decryption occurs by the action itself during the execution.
- On the platform level, there is an AES-256 bit encryption for data at rest. This encryption is being used to secure any credentials stored in the Control Desk.
- Communication between the ProcessRobot server and the Robots, is secured through .Net Framework WCF TCPBinding. The NetTCPBinding, encrypts both the layer as well as the message (AES-256) that is being transported.
- Role Based Access Control (RBAC) and user permissions based on custom roles, allows configuration of granular permissions and access control throughout the platform. ProcessRobot allows users of a specific role to only have access to certain components or component's parts. User authentication can be provided by an Active Directory, or through custom User management within the platform.
- Object-level access is provided, such as security on Processes folders for limited access, for additional security and control.
- Execution of a process as an alternative user, where an administrator (user with elevated privileges) can initiate a process using other credentials than the user who is currently logged in.
- For sensitive data manipulation and use, during Development, ProcessRobot offers the Credentials Manager, where passwords and usernames can be stored encrypted on the SQL Database. Alternatively, credentials can be derived via the active directory or via command line for SoloBots Autologin.
- Also, SSO (Single Sign-On) and Kerberos Authentication is supported by the direct Active Directory integration with ProcessRobot. The above integration in conjunction with the permissions provided to each user, guarantees the security on the platform.
- ProcessRobot uses Redis as a memory caching key value database and message queue broker. Redis offers the option to be password protected. Using a password, the distributed memory data of the ProcessRobot Servers remain secure.
- For the Web Console (Control Desk Thin Client), the HTTPS protocol may be used which reassures secure communication between the Web Browser and the Web Application.



# ProcessRobot core RPA capabilities

## Operational Performance & Productivity



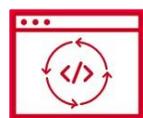
- ✓ Flexible deployments with a number of on premises-cloud options plus High Availability and Disaster Recovery
- ✓ Intelligent, using the latest best-of-breed Cognitive services by Microsoft Google and IBM Watson
- ✓ Concurrency at Robot and Process Level allowing limited or unlimited instances running in parallel, maximizing resource and licensing utilization
- ✓ Attended and Unattended automation enabling collaboration with the end user or between robots, as well as unsupervised execution for maximizing an Enterprise's productivity

## Security



- ✓ Active Directory integration
- ✓ Custom User management
- ✓ Role Based Access Control (RBAC)
- ✓ Credentials Store for secure use and handling of usernames and passwords,
- ✓ Secure Screen execution on Robots,
- ✓ Platform Encryption both at Rest and in Transit.

## Development and Maintenance



- ✓ Easy to use and develop processes with
- ✓ Drag and Drop intuitive interface,
- ✓ Reusability through Controls, Functions and User Libraries,
- ✓ Enabling inexperienced users to create automations,
- ✓ Macro and Web Recorder
- ✓ Advanced editing and debugging capabilities



## Robot and Process Governance



- ✓ 4 levels of Exception Handling to deal with unfortunate situations and minimize errors.
- ✓ Process Version Control and Version's comparison Built-In in the platform.
- ✓ Unique feature of Remote Accessing SoloBots and view or take action on their screen live
- ✓ Queues for elastic resource engagement, prioritization, workload management, with Dynamic SLAs.
- ✓ 4-eyes Principle to double check that a process has indeed been successful, eliminating error or disrupted behavior possibilities.

## Risk and Control



- ✓ Exception Handling in 4 distinguished levels ensuring handling of unexpected or expected unfortunate situations
- ✓ Video playback in case of exception, for rapid error identification and speedy recovery, unique in the market.
- ✓ Minimizing the Risk of process error, due to the centralized Controls Repository and the ability to build unlimited dynamic variable based selectors.

## Auditing/Logging – Insights Analytics



- ✓ In addition to built-in dashboards offered in ProcessRobot, the detailed logs which are being stored can be fed into 3rd party Analytics Tools such as Kibana, in Elastic Search to provide Logging and immense visualization capabilities for even better data driven insights.



# ProcessRobot Hardware and Software Requirements

Deployment requirements for 10 - 100 Robots		Hardware Requirements			Software Requirements	
		CPU*	Disk Space	RAM	Client OS	Server OS
SClient Tools	Minimum	Single - Core	2 GB	2 GB	Windows 7	Windows Server 2008 R2
	Recommended	Dual - Core	4 GB	4 GB	Windows 10	Windows Server 2019
ProcessRobot Server	Minimum	Dual - Core	2 GB	4 GB	Windows Server2008 R2	
	Recommended	Quad - Core	4 GB	8 GB	Windows Server2019	
Redis	Minimum	Single - Core	4 GB	2 GB	(5.0.x)**	
	Recommended	Quad - Core	8 GB	4 GB		
SQL	Minimum	Dual - Core	200 GB***	8GB	Microsoft SQL Server2012	
	Recommended	Quad - Core	500 GB***	16 GB	Microsoft SQL Server 2019	
Network	Minimum	100Mbit Connection				
	Recommended	1GBit Connection				

\* In case the process you are automating requires some resources itself, they would need to be added on top of the above. The above do not include the requirements for the Operating System. A minimum of 1,8Ghz core is required in all cases.

\*\* Please refer to the Redis Documentation on the following link:

<https://redislabs.com/redis-enterprise-documentation/administering/designing-production/supported-platforms>

\*\*\* Please note that the disk space required may increase in case a large amount of processes, robots and logs are used/produced.

\*\*\*\* A prerequisite for ProcessRobot is a Windows Domain. All ProcessRobot components need to run on machines that are members of this domain.



## About Softomotive

Softomotive - the makers of WinAutomation - is one of the leading, longest-standing providers of Robotic Process Automation solutions. We Simplify Automation for over 9,000 customers worldwide, empowering anyone to automate tasks and be given the power to drive innovation.